NASA Procedural Requirements

COMPLIANCE IS MANDATORY

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Subject: Management of Government Quality Assurance Functions for NASA Contracts

Responsible Office: Office of Safety and Mission Assurance

Chapter 2. Government Contract Quality Assurance Requirements

2.1 Critical and Complex Acquisition Items

2.1.1 Critical acquisition items are products or services whose failure poses a credible risk of loss of human life; serious personal injury; loss of a Class A, B, or C payload (see NPR 8705.4); loss of a Category 1 or Category 2 mission (see NPR 7120.5); or loss of a mission resource valued at greater than $2M. Complex acquisition items are hardware products which have quality characteristics that are not wholly visible in the end item and for which conformance can only be established progressively through precise measurements, tests, and controls.

2.1.2 Program and project offices and Center SMA offices (see paragraph 1.2.3.c of this NPR) shall perform Government contract quality assurance for acquisitions involving the supply of critical and complex items in accordance with (Requirement):

a. FAR Part 46, Quality Assurance.

b. NFS Part 1846, Quality Assurance.

c. SAE AS9100, Section 7.4.3, Verification of Purchased Product.

d. Paragraph 2.6 of this NPR, Government Contract Quality Assurance Functions

Note: Space Act Agreements and commercial items acquired per FAR Part 12 do not generally allow or provide for product examination, process witnessing, and auditing functions described in paragraph 2.6.

2.2 Noncritical or Noncomplex Acquisition Items

Program and project offices and Center SMA offices shall perform Government contract quality assurance for acquisitions involving the supply of noncritical or noncomplex items

in accordance with (Requirement):

a. FAR Part 46, Quality Assurance.

b. NFS Part 1846, Quality Assurance.

c. SAE AS9100, Section 7.4.3, Verification of Purchased Product.

d. Government Mandatory Inspection Points (GMIP) per Chapter 8 of this NPR, when determined on a discretionary risk-informed basis to be in NASA's interests.

e. Nonconformance reporting and corrective action per paragraph 2.6.5 of this NPR as deemed necessary and appropriate in accordance with NASA's interests.

f. Final product acceptance requirements per paragraph 2.6.6 of this NPR.

2.3 Commercial Items Acquired under FAR Part 12

2.3.1 Program and project offices and Center SMA offices are responsible for performing Government contract quality assurance of acquisitions involving the supply of commercial items acquired under FAR Part 12 procedures that exceed an acquisition threshold of $2M in accordance with paragraphs 2.3.2 - 2.3.7 below.

Note: Common NASA usage of the term "commercial" (e.g., Commercial Orbital Transportation Services, Commercial Crew Development) may or may not coincide with the FAR definition and usage of the term. Use of the term "commercial," other than within the context of Federal regulations, should not be understood to mean that FAR Part 12 procedures apply.

2.3.2 FAR Part 12.208 requires that contracts for commercial items "...rely on contractors' existing quality assurance systems as a substitute for Government inspection and testing before tender for acceptance unless customary market practices for the commercial item being acquired include in-process inspection. Any in-process inspection by the Government shall be conducted in a manner consistent with commercial practice." Program and project offices and Center SMA offices shall also conduct in-process inspections and testing at contractor facilities when acceptance inspection in order to establish conformance of critical attributes (see paragraph 2.3.6 below) cannot be performed at any other time or location without uneconomical disassembly, destructive testing, or voiding contractor warranties (Requirement).

2.3.3 Program and project offices and Center SMA offices shall perform Document Review, Record Review, and Quality Data Analysis in accordance with paragraph 2.6 of this NPR to assure the adequacy of contractor quality system practices and provide confidence that the contractor will deliver conforming items (Requirement).

> *Note: Government contract quality assurance methods that involve in-process inspection, testing, or auditing at contractor facilities are commonly referred to as "oversight." Quality assurance methods that do not involve in-process inspection, testing, or auditing, such as Document Review, Record Review, and Quality Data Analysis, are commonly referred to as "insight."*

2.3.4 Program and project offices and Center SMA offices shall contact the contractor in cases where Document Review, Record Review, or Quality Data Analysis identifies unacceptable risk, for resolution of quality deficiencies and concerns (Requirement).

2.3.5 Industry-managed third party certification and accreditation processes, where such processes are determined to be credible and objective, shall be utilized in commercial contracts as a substitute for NASA audits and surveillance to attain confidence that contractor quality system processes are adequately performed and will result in delivery of conforming item(s) (Requirement).

2.3.6 Program and project offices and Center SMA offices shall develop and perform

acceptance inspection procedure(s) to assure conformance of critical hardware attributes (Requirement). Nonconformances identified during acceptance inspections are reported and resolved in accordance with paragraph 2.6.5, of this NPR.

2.3.7 Program and project offices and Center SMA offices shall use commercial warrantees, per FAR 12.404, to assure that the item conforms to contract requirements, is of at least medium-grade quality, and is fit for use (Requirement).

2.4 Commercially Available Off-the-Shelf (COTS) Items

2.4.1 COTS items, as defined in FAR Part 2, should be excluded from use in critical applications when non-COTS supply sources are available except where quality data demonstrates that the item meets requisite high quality and reliability standards or it is otherwise determined that procurement of the COTS item is in NASA's interests.

2.4.2 Program and project offices and Center SMA offices shall examine critical COTS items to the maximum extent practicable to ensure conformance of critical product attributes (Requirement). Examination may include physical inspections, tests, nondestructive evaluation, and data analysis.

2.5 Research and Development Acquisitions

2.5.1 Government contract quality assurance for research and development (R&D) is governed by FAR Part 46 and NFS Part 1846.

> *Note: Research and development acquisitions include basic research, applied research, and technology development. For the purposes of this NPR, the term "research and technology (R&T)," as used and defined in other NASA documents, is considered equivalent.*

2.5.2 Program and project offices and Center SMA office personnel (see paragraph 1.2.3.c of this NPR) shall perform quality system evaluation for R&D contracts that meet the definition of "critical acquisition item" provided in paragraph 2.1 of this NPR or require adherence to a higher level quality standard (e.g., ISO 9001) (Requirement). Quality system evaluation is to be performed in accordance with paragraph 2.6.3 and include the following elements:

a. Control of documents.

b. Control of records.

c. Personnel competence.

d. Purchasing.

e. Preservation of product.

f. Calibration and control of monitoring, measuring, and test devices.

2.6 Government Contract Quality Assurance Functions

The functions described in paragraphs 2.6.1 through 2.6.6.1 shall be performed by the program office, project office, or Center SMA office, including delegated representatives of those offices (Requirement).

2.6.1 Document Review

2.6.1.1 Review contractor-developed documents when first developed, or whenever document changes are made that affect quality system processes or product attributes, to ensure compliance with contract technical requirements and for adequacy in achieving item conformity (Requirement). Contractor documents include internal work procedures, process instructions, technical documents, and drawings.

2.6.1.2 Select documents for review based on the criticality, complexity, cost, and importance of the product or process that is documented and past product/process performance (Requirement). Document review may be conducted as a separate process from, or in conjunction with, quality system evaluation.

2.6.2 Product Assurance

2.6.2.1 Perform product examination, process evaluation, and record review as described below to assure contractor hardware products (Requirement).

2.6.2.1.1 Product examination involves physical inspection, measurement, and testing of the supplier product to ensure conformity to contract requirements.

2.6.2.1.2 Process-witnessing involves personal observation of supplier work processes or demonstration to ensure compliance with prescribed work instructions and contract requirements. Work processes include processes related to manufacturing, fabrication, assembly, integration, repair, maintenance, refurbishment, test, and inspection.

2.6.2.1.3 Record review involves the examination of recorded evidence demonstrating conformance to contract requirements to ensure product and process conformance to contract requirements. Recorded data, including contractually required data deliverables (e.g., Safety Data Package, Structural Analysis and Reliability Predictions), may document work performance, product attributes, product configuration, product performance, or quality assurance actions performed by the contractor (inspections, tests, measurements).

2.6.2.2 Base the selection of product assurance actions and the sample size and frequency of attribute selection on the following risk factors (Requirement):

(1) The criticality, complexity, cost, and importance of product supplied.

(2) The complexity and maturity of the process performed.

(3) Personnel safety considerations.

(4) The supplier's past quality performance related to the product supplied or process performed.

Note: Government Mandatory Inspection Points (GMIPs) are Government product assurance actions that are performed on a mandatory basis. GMIP requirements are provided in Chapter 8 of this NPR.

2.6.2.3 Pre-identify product assurance attributes on checklists or by another documented methodology (Requirement).

2.6.2.4 Attest to the accomplishment of product assurance actions by signature, legible-printed name and date, or by an inspection control system such as inspection stamps or electronic medium (Requirement).

2.6.2.4.1 Identify the discrete item examined (including any unique product identification/traceability information), process-witnessed or record-verified and reference the specific requirement being validated, when attesting to the accomplishment of product assurance actions using signatures, stamps, or data entries, (Requirement). Such documentation may be accomplished utilizing the contractor's approved electronic system for indicating inspection status or by the application of a signature or stamp to prerecorded planning documents or records (e.g., material test data) which contain this information.

2.6.2.4.2 Employ an inspection control system when attesting to the accomplishment of product assurance actions using stamps or an electronic medium, that (Requirement):

(1) Indicates the date of acceptance.

(2) Ensures the legibility and durability of stamp impressions and ensure that stamps do not interlock with other stamps.

(3) Ensures that only properly authorized and qualified persons are permitted to apply stamps or make data entries and that individuals who are authorized to use stamps maintain control of their assigned stamp at all times.

(4) Ensures that data entries and/or stamp impressions provide direct traceability to the individual applying the stamp or making the data entry.

2.6.2.4.3 Not apply stamps, where stamps are applied to inspected supplies, to attest to the accomplishment of product assurance actions in a manner prohibited by drawings or specifications or which may degrade the quality of the product (Requirement).

2.6.2.5 Perform product-assurance actions at subcontractor locations only where necessary to ensure that the contracted organization maintains effective oversight of subcontractors or to ensure compliance with critical product attributes (see paragraph 8.3.f) (Requirement).

2.6.2.6 Be properly qualified and trained concerning the quality assurance technique being practiced and the specific product or processes for which assurance is being provided (Requirement).

2.6.2.7 Control monitoring and measuring devices to the same/applicable requirements invoked upon the contractor (Requirement).

2.6.2.8 Use statistically valid sampling plans, when performing product assurance actions on a sampling basis for which there is a measurable population of items, to achieve prescribed confidence-level objectives (Requirement).

2.6.3 Quality System Evaluation

2.6.3.1 Evaluate the contractor's quality system to ensure compliance with invoked quality program requirements including internally developed procedures (Requirement). Quality system evaluation may be conducted as a single audit or as a combination of discrete audits.

2.6.3.2 Base the frequency of quality system evaluation on the contracted organization's quality history but no less than once every three years (Requirement). Quality system evaluation may be extended in periodicity, exempted, or limited in scope for circumstances where each of the conditions listed in subparagraphs (1), (2), (3), and (4) below exists. For limited scope evaluations, the determination of quality system attributes is to be based on the criticality and complexity of quality system processes and contractor past performance.

(1) The contractor is certified by an accredited SAE AS9100 Certification Body or the contractor's quality system has been formally evaluated and accepted by another Government agency.

(2) Government surveillance (e.g., GMIPs, process witnessing) data, where available, indicates satisfactory levels of compliance.

(3) Quality data and other risk factors (e.g., product/process maturity, AS9100 certification audit results, facility relocation), where available, indicate acceptable risk.

(4) Product delivery data, where available, indicates that the contractor has a history of delivering product that meets contract quality requirements. Supplier quality data can be obtained via the NASA Supplier Assessment system at http://sas.nasa.gov.

Note: The following quality system elements, as applicable, are recommended for periodic auditing:

(1) Control of documents.

(2) Control of records.

(3) Control of critical items.

(4) Control of counterfeit parts.

(5) Risk management.

(6) Configuration management.

(7) Personnel training, qualifications, and competence.

(8) Design and development control.

(9) Purchasing, including supplier evaluation/selection, purchasing information, flow-down of technical/quality requirements, and verification of purchased product.

(10) Production control and process control.

(11) Product identification, traceability, and identification of inspection/test status.

(12) Preservation of product, including control of electrostatic discharge, shelf-life control, foreign object debris prevention, detection, and removal, and cleanliness control.

(13) Calibration and control of monitoring, measuring, and test devices.

(14) Monitoring and measurement, including internal audit, monitoring and measurement of processes, and monitoring and measurement of product.

(15) Control of nonconforming product.

(16) Corrective action.

(17) Control of Government Furnished Property.

2.6.3.3 Perform and document quality system audits following written audit attributes such as provided in SAE AS9101 (Requirement).

2.6.3.4 Include in-quality system auditing product sampling based on the criticality, complexity, and maturity of the product, personnel safety considerations, and the supplier's past performance related to the product to validate quality system effectiveness (Requirement).

2.6.3.5 Forward quality system audits results involving findings against Agency-wide quality standards (e.g., SAE AS9100, NASA Workmanship Standards) to Supplier Assessment System (SAS) administrators at jsc-sasAdmin@mail.nasa.gov for posting to the SAS Web site (http://sas.nasa.gov/) and Agency-wide availability (Requirement). Results pertaining to program/project unique contract requirements or preliminary findings are not required to be forwarded.

2.6.3.6 Report major nonconformance findings and other significant shortcomings in the contractor's quality processes that affect, or potentially affect, the acceptability of hardware for dissemination to affected parties (e.g., other Government agencies, AS9100 accreditation body, AS9100 Registrar Management Committee, Online Aerospace Supplier Information System) to the NASA Office of Safety and Mission Assurance (Requirement).

2.6.4 Quality Data Analysis

2.6.4.1 Collect and analyze contractor quality data not less than annually (Requirement). This data will be used for:

(1) Identifying problem areas (e.g., products, processes, operations, organizations), common deficiency causes, quality trends, and process variations.

(2) Adjusting the frequency and content of customer oversight actions, including allocation of quality assurance personnel resources.

(3) Providing supporting rationale for acceptance/rejection of the contractor's quality

system and/or written procedures.

(4) Initiating corrective action based on identification of systemic problems and trends.

(5) Sharing information with the contractor to identify quality system trends and areas of weakness.

2.6.4.2 Collect data from contractor-generated metrics, NASA-identified nonconformances, post-delivery quality escapes, and quality data reported by other parties (e.g., DCMA, quality assurance support contractors, and accredited quality system registrars) (Requirement).

2.6.5 Nonconformance Reporting and Corrective Action

2.6.5.1 Document and report Government-identified nonconformances to the contractor for performance of corrective and preventive actions (Requirement).

2.6.5.2 Elevate corrective action requests to the appropriate level of contractor management based on problem criticality, recurrence, and/or nonresponsiveness (Requirement).

2.6.5.3 Require contractor corrective actions to identify (Requirement):

(1) The root cause(s) for occurrence of the nonconformance.

(2) The scope of the nonconformance (i.e., total population of nonconforming items based on the identified root cause(s)).

(3) Remedial corrective actions taken concerning the product(s) found to be nonconforming.

(4) Measures taken/planned to prevent recurrence of the nonconformity.

2.6.5.4 Follow up on nonconformances determined to be systemic, repetitive, or critical in nature to ensure effective accomplishment of contractor corrective action (Requirement). Government follow-up may consist of first-hand observations or review of verifiable contractor- submitted documentation.

2.6.5.5 Enter Government-identified nonconformances and corrective action reports into an electronic nonconformance reporting and corrective action tracking system and, as appropriate for source evaluation/selection purposes, a past performance information management system (Requirement).

2.6.6 Final Acceptance

2.6.6.1 Verify that contractor supplies and services conform to contract quality and quantity requirements and are formally accepted for delivery to the Government based on performance of the actions prescribed below except where acceptance of nonconforming supplies is determined to be in the Government's interest (see FAR 46.407 and Subpart 46.5) or where provided for by other terms and conditions of the contract (Requirement).

(1) Final product inspection.

(2) Validation that there are no outstanding corrective actions resulting from Government or contractor-identified nonconformances affecting acceptability of product.

(3) Validation that there are no outstanding engineering waivers/deviations impacting acceptability of product and that all applicable engineering waivers/deviations have been approved by the proper technical authority.

(4) Validation that all required GMIPs, or other contractor-notified mandatory surveillance actions, have been accomplished.

Note: Performance of final acceptance is an inherently Governmental function which is the responsibility of the NASA contracting officer or his/her Government

delegate. Performance of final acceptance may not be delegated to a non-Governmental entity.

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